

Please replace the last paragraph on page 16 with the following replacement

paragraph:

Fig. 14 is a side view showing a condition;

Please replace the last paragraph on page 17 with the following replacement

paragraph:

Fig. 23 is a sectional view of Fig. 22 showing an important part of the print head according to the fifth embodiment;

Please replace the last paragraph on page 20 with the following replacement

paragraph:

The head frame 4 is formed of a material having the same coefficient of linear expansion as a semiconductor substrate of the substrate member, 6 which will be described below. When, for example, a silicon substrate is used as the semiconductor substrate, silicon nitride is used for forming the head frame 4. Alternatively, alumina (Al_2O_3), mullite, aluminum nitride, silicon carbide, etc., may be used from the group of ceramics, quartz (SiO_2), etc., may be used from the group of glass, and INVAR, etc., may be used from the group of metals.

Please replace the third paragraph on page 21 between lines 16-19 with the following replacement paragraph:

A plurality of head chips HC are formed by laminating substrate members 6 on the nozzle-formed member 2. Accordingly, a plurality of head chips HC are formed on a single nozzle-formed member 2 (see Fig. 2).

Please replace the second paragraph on page 25 between lines 4-17 with the following replacement paragraph:

The nozzle interval of a completed print head 7 is determined by a required precision of a printer in which the print head 7 is to be installed. Accordingly, L2 is determined in a design phase. In such a case, the required L1 can be inversely calculated based on the graph

shown in Fig. 10 from the coefficient of linear expansion (1 of the nozzle-formed member 2, the coefficient of linear expansion (2 of the semiconductor substrate 7 (which is also the coefficient of linear expansion of the head frame 4), the laminating temperature T1 of the nozzle-formed member 2 and the head frame 4, and the temperature difference (T between the laminating temperature T1 and room temperature (R.T.). Alternatively, L2 may also be calculated from the following equation.

Please replace the second paragraph on page 32 between lines with the following replacement paragraph:

In the print head 1, the head frame 4, which has approximately the same coefficient of linear expansion as that of the semiconductor substrates 7 (for example, silicon substrates) which are the base substrates of the substrate members 6, is first laminated on the nozzle-formed member 2. Then, the substrate members 6 are laminated on the nozzle-formed member 2 at a temperature lower than the laminating temperature of the head frame 4 and the nozzle-formed member 2. Accordingly, the interval between the ink-ejection nozzles 3 formed in the nozzle-formed member 2 and the interval between the heating elements 8 formed in the substrate members 6 are always the same at temperatures lower than the laminating temperature of the nozzle-formed member 2 and the head frame 4. Thus, a print head having improved characteristics of ink drop ejection can be obtained. Even when the size of the substrate members 6 and the numbers of heating elements 8 and the ink-ejection nozzles 3 provided for a single substrate member 6 are increased, displacements between the exothermic elements 8 and the ink-discharge nozzles 3 do not easily occur. Accordingly, the size of the print head 1 can be easily increased, and thus the print head 1 is especially suitable for long print heads such as print heads for line printers, etc.

Please replace the paragraph on page 36 between lines 19-24 with the following replacement paragraph:

For example, the print head 30 may be manufactured by a following process using a silicon wafer (single-crystal silicon) as a material of the semiconductor substrates 7, which are the base members of the substrate members 6, a dry film resist as a material of the barrier layer 10, and INVAR alloy as a material of the nozzle-formed member 2.

Please replace the last paragraph on page 37 with the following replacement paragraph:

INVAR alloy, of which the nozzle-formed member 2 is formed, consists of 64% ferrum (Fe) and 36% nickel (Ni), and, as can be seen from a graph shown in Fig. 13, has a coefficient of linear expansion of 1.2×10^{-6} . Thus, the coefficient of linear expansion of INVAR alloy is almost the same as that of silicon (2.6×10^{-6}), which is the base material of the substrate member 6. When the print head 30 is constructed as described above, the displacements between the heating elements 8 and ink-ejection nozzles 3, and between the ink-pressurizing cells 9 and the ink-ejection nozzles 3, are of only an extremely small amount, and degradation of the printing quality can be prevented.

Please replace the first paragraph on page 38 with the following replacement paragraph:

As described above, INVAR alloy consists of 64% ferrum (Fe) and 36% nickel (Ni), and has the coefficient of linear expansion of 1.2×10^{-6} , which is the minimum value in the graph shown in Fig. 13. When the content of ferrum (Fe) is close to 64%, the coefficient of linear expansion becomes higher than the minimum value (see Fig. 13). Accordingly, an alloy, in which the content of ferrum (Fe) is adjusted around 64% so that the difference in coefficients of linear expansion between the silicon and the alloy is reduced, may also be used.

Please replace the last paragraph on page 47 with the following replacement paragraph:

The shapes and structures of the members of the above-described third and fourth embodiments are described merely for illustrating an example of a print head to which the present invention is applied, and are not intended to limit the scope of the present invention.

Please replace the last paragraph in page 49 with the following replacement paragraph:

The head frame 24 is formed of a material having the same coefficient of linear expansion as a semiconductor substrate of the substrate member, which will be described below. When, for example, a silicon substrate is used as the semiconductor substrate, silicon nitride is used for forming the head frame 24. Alternatively, alumina (Al_2O_3), mullite, aluminum nitride, silicon carbide, etc., may be used from the group of ceramics, quartz (SiO_2), etc., may be used from the group of glass, and INVAR, etc., may be used from the group of metals.